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The Oxford Handbook of EVIDENTIALITY

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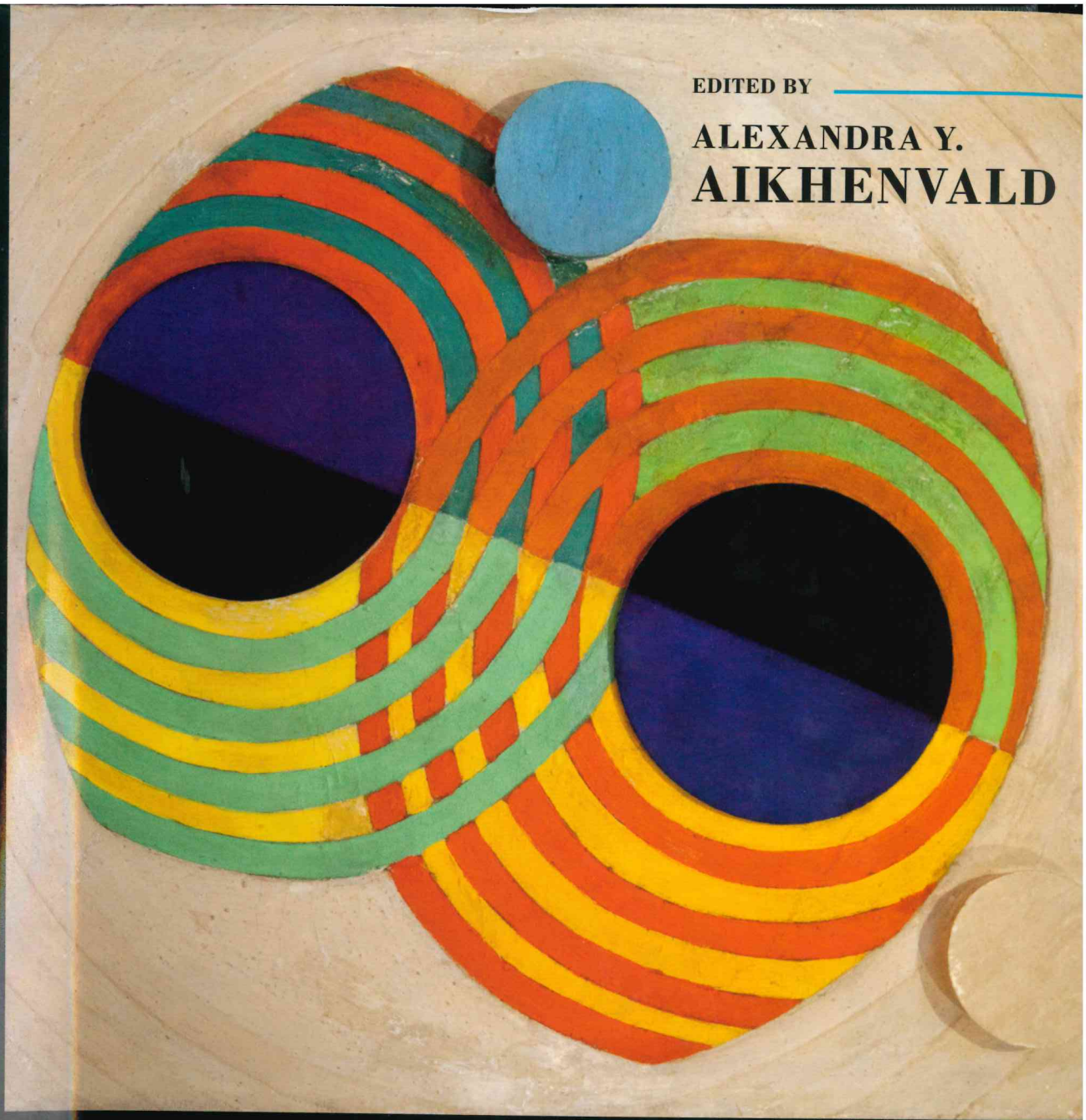

EDITED BY

ALEXANDRA Y. AIKHENVALD

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PART II

EVIDENTIALITY IN COGNITION, COMMUNICATION, AND SOCIETY

CHAPTER 8

EVIDENTIALS, INFORMATION SOURCES, AND COGNITION

ERCENUR ÜNAL AND ANNA PAPAFRAGOU

8.1. Information sources in cognition and language

Humans rely on various experiences to find out new information about the world around them. Information about the world can be acquired directly through various perceptual processes (e.g. *seeing* a vase break) or indirectly through communication or various types of inferences (e.g. *figuring out* that the vase broke based on pieces of glass). These experiences (e.g. visual or auditory perception, hearsay, inference) that characterize the conditions under which we discover information are known as *sources of information* (Johnson, Hashtroudi, and Lindsay 1993). The process of attributing a piece of information to a specific source is known as *source monitoring* (Johnson 1988).

Experimental research has shown that people do not tag their memories with source information. Instead, source monitoring decisions are based on how well the subjective characteristics of a given memory match the generic profile of a source. For instance, if a memory is highly rich in visual details, people tend to attribute it to visual perception (Johnson, 2006; Johnson et al. 1993). Because of the subjective nature of this process, people are not always accurate in their source monitoring decisions. In fact, several studies with speakers of English have shown that people often make source monitoring errors and mistakenly report directly perceiving things that they have only indirectly acquired through imagination, visualization or inferences (Anderson 1984; Durso and Johnson 1980; Johnson, Kahan, and Raye 1984; Johnson, Raye, Wang, and Taylor 1979; Johnson, Taylor, and Raye 1977). For instance, people who have read descriptions of scenes report having seen pictures of those scenes (Intraub and Hoffman 1992); similarly, people who have read sentences that give rise to certain conversational inferences misremember the content of those pragmatic inferences as having been explicitly stated (Bransford and Franks 1971; Brewer 1977; Chan and McDermott 2006; Fazio and Marsh 2010; Harris 1974; Harris and Monaco 1978).

Developmental research on source monitoring has shown that children's understanding of the conditions that lead to knowledge develops over a lengthy period. Visual access seems to be understood early: in simple tasks, even three-year-olds can identify someone who has looked inside a box as knowledgeable about a box's contents over someone who has simply lifted the box (Pillow 1989; cf. Pratt and Bryant 1990). Furthermore, between the ages of four and six, children can selectively use visual access to learn about visible properties of someone such as their hair colour), but children can use verbal communication to learn about invisible properties of someone, such as whether they speak French (Fitneva, Lam, and Dunfield 2013). Furthermore, children report being more confident about their own knowledge when they gain it through visual access compared to being informed by someone else (Koenig, Clement, and Harris 2004; Robinson, Haigh, and Nurmsoo 2008). Understanding the causal link between inferential access and knowledge does not develop until age six (Sodian and Wimmer 1987, cf. Miller, Hardin, and Montgomery 2003, but see Keenan, Ruffman, and Olson 1994). In one study, six- but not four-year-olds could tell that someone who has not looked inside a container filled with balls could infer the colour of the balls using a critical premise (i.e. they knew that the balls were transferred from a transparent container containing balls of the same colour; Sodian and Wimmer 1987). Understanding more subtle distinctions among types of inference continues to develop over the primary school years or sometimes even later (cf. Pillow 1999, 2002; Pillow and Anderson 2006; Pillow, Boyce, and Stein 2000).

In this chapter, we consider how conceptual representations of information sources make contact with language. Human language has the means to encode information sources (through *evidentiality* distinctions) but—as shown throughout this volume—there is considerable cross-linguistic variation in this domain. In many languages, information sources are not grammatically marked: in English, the sentence (1a) can be used whether the speaker has directly witnessed the event or has only indirect information about it, even though it is possible to lexically specify informational access, as in (1b). About a quarter of the world's languages mark evidential distinctions in their grammatical systems (Aikhenvald 2004a, 2014). For instance, in Turkish, two verbal suffixes, *-dI* and *-mIş*, encode evidential distinctions between direct and indirect past experience respectively (Aksu and Slobin 1986; Aksu-Koç 1988; Göksel and Kerslake 2011; Kornfilt 1997; Slobin and Aksu 1982). In sentence (2a) *-dI* encodes the speaker's firsthand experience of the basic level proposition conveyed in the utterance. In sentence (2b) *-mIş* encodes the speaker's indirect acquisition of the information either through verbal communication or inference. All past-tense sentences involve a choice between these two suffixes.

(1) a. Ali arrived.

b. I saw/heard/figured out that Ali arrived.

(2) a. Ali gel-di.
Ali come-PAST.DIR.3SG
Ali came (DIRECT)

b. Ali gel-miş.
Ali come-PAST.INDIR.3SG
Ali came (INDIRECT)

This variation raises the question whether cross-linguistic evidential differences might be reflected in the corresponding source concepts. Could speakers of a language with grammaticalized and obligatory evidential devices, such as Turkish, be less prone to source monitoring errors compared to speakers of a language that lacks such devices, such as English? And might source concepts emerge earlier in learners of languages such as Turkish compared to learners of English?

These questions connect to a broader debate concerning the relation between language and cognition (for recent reviews, see Bowerman and Levinson 2001; Casasanto 2008; Gentner and Goldin-Meadow 2003; Gleitman and Papafragou 2005, 2012; Gumperz and Levinson 1996 Landau, Dessalegn, and Goldberg 2010; Lupyan 2012; Malt and Wolff 2010; Ünal and Papafragou, in press; Wolff and Holmes 2011; see also Sapir 1924; and Whorf 1956 for early discussions). This debate involves two prominent views that both presume that language and thought are tightly related but differ with respect to the direction of the causal flow between language and thought. In one view, habitual differences in the way languages frame the world may lead to differences in how accessible certain conceptual representations are to speakers of these languages (Bowerman and Choi 2001; Bowerman and Levinson 2001; Levinson 2003; Sapir 1924; Whorf 1956). Importantly, the changes in conceptual representations might be more or less permanent, such that they are at play regardless of whether or not speakers are explicitly using language. According to an alternative view, language reflects largely shared universal conceptual representations without changing them (Chomsky 1975; Fodor 1975; Gleitman and Papafragou 2005, 2012; Landau and Jackendoff 1993). This position acknowledges that people may recruit language while performing cognitive computations but posits that these linguistic influences are transient and often diminish or disappear when speakers are prevented from accessing language (Landau et al. 2010; Trueswell and Papafragou 2010). In the specific case of evidentiality, these positions make different predictions, with the former expecting wider language-driven discontinuities in adults' source monitoring performance compared to the latter.

The two broad positions sketched above about the nature of the language-cognition interface have different expectations about how language might relate to cognitive development. If language-specific semantic encoding patterns increase the salience of certain conceptual distinctions, the process of acquiring the semantics of one's language might accelerate cognitive development in the relevant domain (e.g. Bowerman and Choi 2001; Bowerman and Levinson 2001). According to an alternative view, semantic distinctions in language map onto already existing conceptual prerequisites, and thus language builds upon rather than scaffolds cognitive development (e.g. Chomsky 2000; Gleitman 1990; Pinker 1984). In the specific case of evidentiality, the first position expects that acquiring the semantics of obligatory and frequent evidential morphemes might accelerate the development of children's source monitoring, whereas the second position expects source monitoring development to follow a more stable, perhaps universal timetable.

Until recently, most studies of adults' and children's source monitoring had been conducted with speakers of English and other languages where evidentiality is not grammaticalized so these competing predictions could not be addressed. In the sections that follow, we review newly available experimental evidence to assess whether the linguistic encoding of information source affects source monitoring in adults (§8.2) and children (§8.3) from different language backgrounds, and discuss the conclusions in the context of broader theoretical debates about the language–cognition interface.

8.2. Cross-linguistic variation and adults' source monitoring

Could cross-linguistic differences in the way Turkish and English speakers encode evidentiality in language lead to differences in their memories for information sources? A study by Tosun, Vaid, and Geraci (2013) addressed this question by comparing Turkish and English monolinguals and Turkish-English bilinguals on their memories for information presented in firsthand versus non-firsthand form. In the study phase, participants read sentences presented on a computer screen. In Turkish, half of the sentences were in firsthand form and marked with direct past tense (*-dI*), the other half were in non-firsthand form and marked with indirect past tense (*-mIş*). In English, half of the sentences were in firsthand form and included only a past tense verb (e.g. *Mary missed her flight*), the other half were in non-firsthand form and included an adverbial and a past tense verb (e.g. *Mary allegedly missed her flight*). Later participants completed a memory test in which they were given another set of sentences and reported whether they had read each sentence before, as well as the original form (firsthand versus non-firsthand) of the sentences. English speakers were equally accurate for sentences presented in firsthand and non-firsthand form. Furthermore, their accuracy in reporting the original form of the sentence did not differ depending on whether the sentence was in firsthand or non-firsthand form. By contrast, Turkish monolinguals and Turkish-English bilinguals were less accurate in recognizing sentences presented in non-firsthand form. Furthermore, they misremembered the original form of non-firsthand sentences as having been in firsthand form.

Tosun et al. have argued that these findings support the position that cross-linguistic differences shape source memory. However, several aspects of their methodology raise issues about the interpretation of these cross-linguistic differences. First, the stimuli and the task used for the English and Turkish groups were not equivalent. While English speakers reported merely the presence or absence of a lexical item (i.e. the evidential adverb), Turkish speakers made more detailed judgements and reported which one of the two evidential morphemes (*-dI or -mIş*) marked the verb—which might be harder than remembering lexical items. Second, Tosun et al. did not include an independent measure of cognitive equivalence among English and Turkish speakers. These differences in the stimuli and potential differences among the language groups might drive the cross-linguistic differences in memory performance.

At the very least, these findings suggest that the *explicit* linguistic form of an utterance might influence subsequent memory for the information conveyed in that linguistic message. These findings also cohere with the findings of a recent study with only Turkish-speaking adults, which showed that explicit choices about the evidential morpheme included in linguistic messages might influence suggestibility to misinformation (Aydın and Ceci 2013). Nevertheless, both studies diverge from typical investigations of the language–cognition interface in which speakers of different languages are compared on a *non-linguistic* task (for an overview of studies within this paradigm, see Gleitman and Papafragou 2005, 2012). Thus, both studies leave open the question of whether speaking a language that obligatorily encodes evidentiality influences source memory even in the absence of explicit involvement of language.

A subsequent study by Ünal, Pinto, Bunger, and Papafragou (2016) addressed this question more directly. In an initial experiment, native speakers of English and Turkish were asked to describe photographs of change of state events. Half of the photographs depicted the point after which an event took place so that what happened could be inferred on the basis of post-event visual evidence (e.g. a woman next to bubbles travelling in the air); the other half depicted the point at which an event was unfolding so that what happened could be directly seen (e.g. a woman blowing bubbles). Linguistic descriptions confirmed the presence of strong cross-linguistic differences: English speakers did not use any evidentiality devices in their descriptions, whereas Turkish speakers marked the events they had seen with the direct morpheme (*-dI*) 73% of the time and the events they had inferred with the indirect morpheme (*-mIş*) 64% of the time. Closer inspection of the data revealed that Turkish speakers' use of the indirect evidential for inferred events was sensitive to the strength of the post-event visual cues that gave rise to an inference: in half of the inferred events, post-event visual cues were ambiguous and clearly different from a perceived event, and Turkish speakers used the indirect morpheme 80% of the time ('high-indirectness' events); in the other half, post-event visual cues yielded secure inferences that were closer to direct perception, and Turkish speakers used the indirect morpheme only 48% of the time ('low-indirectness' events).

Despite these cross-linguistic differences, there were also commonalities in how people from the two language groups handled subtle aspects of information sources. When asked to judge whether they had 'seen' or 'inferred' the events used in the description task, a control group of English speakers chose 'seen' for the seen events (that were also overwhelmingly marked with the direct marker in Turkish), 'inferred' for the high-indirectness events (that consistently elicited indirect morphology in Turkish), and both 'seen' and 'inferred' options equally for the low-indirectness events (that elicited indirect morphology in Turkish only about half of the time). Thus the conceptual distinctions between evidence types drawn by English speakers (whose language lacks grammatical evidential distinctions) appear to align with fine-grained distinctions between direct versus indirect evidence that underlie the use of evidential morphology in Turkish.

To examine potential effects of language on the ability to track sources of information, Ünal et al. (2016) asked new groups of speakers of Turkish and English to complete a source memory task. In a study phase, participants saw the set of photographs from the description task depicting seen and inferred events (alongside additional photographs that served as fillers). In a later memory phase, they saw a second set of photographs where each of the inferred events was replaced by the seen version of the very same event (depicted by the point at which the event unfolded). In both language groups, half of the participants had to merely report whether they had 'seen' or 'not seen' the event, and the other half had to complete more detailed source judgements by choosing one of three options: 'seen', 'inferred' or 'neither'. If language influences source monitoring, then Turkish speakers should be more accurate in their source memories than English speakers, especially for the high-indirectness events that were consistently marked in Turkish with the indirect evidential. If source monitoring is independent from language, then Turkish and English speakers should be equally prone to source monitoring errors. The results were consistent with the second possibility: Turkish and English speakers were equally accurate in their source memory (with accuracy hovering around 70%). Furthermore, for both groups, error rates were higher for low-indirectness events (i.e. events that were closer to perception and were more confusable with seen events) as opposed to high-indirectness events. Finally, when

participants who completed the detailed source judgements made an error and failed to report having 'inferred' the event, they reported having 'seen' the event regardless of their linguistic background (cf. also Anderson 1984; Durso and Johnson 1980; Johnson et al. 1977; Johnson et al. 1979).

In sum, studies with Turkish-and English-speaking adults demonstrate that these language groups differ in how they mark source of information linguistically. Cross-linguistic differences in memory performance emerge in contexts where speakers are required to process linguistic material as part of a cognitive task. Nevertheless, these cross-linguistic differences do not extend to contexts where adults are asked to perform a truly non-linguistic task. Taken together, cross-linguistic studies comparing Turkish and English adults' memories for source of information suggest that long-term experience with the evidential categories of one's native language does not shape conceptual representations of information sources.

8.3. Cross-linguistic variation and children's source monitoring

There is considerable research on the acquisition of evidential morphology (Aksu and Slobin 1986; Aksu-Koç 1988, 2000; Aksu-Koç et al. 2009; Courtney 1999; 2014; Ozturk and Papafragou 2016; Papafragou et al. 2007; Uzundag, Tasci, Küntay, and Aksu-Koç 2016; Ünal and Papafragou 2016; de Villiers et al. 2009; for an overview see Matsui 2014; and Fitneva, Chapter 9 of this volume). Some of this work has also included non-linguistic assessments of children's source monitoring and has found a tight relation between linguistic evidentiality and conceptual representations of information sources (Aksu-Koç 1988, Ozturk and Papafragou 2016; Papafragou, Li, Choi, and Han 2007; Ünal and Papafragou 2013, 2016). In a recent demonstration, young learners of Turkish produced and comprehended the direct evidential (*-dI*) before the indirect evidential (*-mIş*) in linguistic tasks (Ozturk and Papafragou 2016). Interestingly, the same children had higher success in identifying direct sources, such as visual perception, as the experience that led to their own or someone else's beliefs compared to indirect sources, such as inference or hearsay. In another study, Turkish-speaking children between the ages of three and six produced evidential morphemes accurately but had difficulty comprehending evidentially marked utterances (Ünal and Papafragou 2016, cf. also Aksu-Koç 1988; Ozturk and Papafragou 2016; Papafragou et al. 2007). Importantly, in the same study, children of the same age groups had difficulty reasoning about others' evidence even when the task did not involve knowledge of evidential language; but the difficulty disappeared when children were accessing their own information sources. These studies thus reveal asymmetries between sources (direct versus indirect) and perspectives (self versus others) that persist across linguistic and non-linguistic contexts and suggest a homology between linguistic evidentiality and underlying non-linguistic source concepts.

The presence of such homologies leaves all options open as to whether source concepts might be susceptible to influences of language. An obvious possibility that is left open is that processing evidentially marked linguistic information when performing a cognitive task could influence performance (as in the Tosun et al. study with adults in §8.2). Aydın and Ceci (2009, 2013) tested this possibility. In their study, English and Turkish-speaking children between the ages of four and six first heard a narrative describing a birthday party (e.g. 'She spilled the

orange juice'). Then, they heard another adult describing misleading information about the birthday party (e.g. 'She spilled the apple juice'). Both the original and the misleading information was evidentially marked in both languages (morphologically with *–dI* or *–mIş* in Turkish and lexically with 'I saw' or 'I heard' in English). Importantly, the evidential form in the original and the misleading descriptions was either the same (i.e. direct-direct or indirect-indirect) or different (direct-indirect or indirect-direct). Children were given a forced-choice memory task where they had to respond to questions about the details of the birthday party. Of interest was whether children would be less suggestible for original information in direct form followed by misleading information in indirect form compared to the opposite situation, and whether this difference would be greater for Turkish-speaking children compared to English-speaking children. Overall, Turkish-speaking children were more accurate than English-speaking children. However, the interaction between language and the evidential form in the original-misleading information sequence (i.e. direct-indirect versus indirect-direct) that would lend support for the prediction above did not reach significance (even though there was a trend in the direction that the authors expected). Thus, whether the evidential form in an utterance has further cognitive implications in children remains an open question.

A different question is whether distinctions within the domain of information sources might develop earlier in learners of languages such as Turkish that obligatorily or grammatically mark these distinctions compared to learners of languages such as English that mark these distinctions only lexically and thus optionally and less systematically. Notice that the lack of source monitoring differences between Turkish- and English-speaking adults (see §8.2) does not preclude the possibility of language exerting strong and early effects on the development of source reasoning in less mature learners.

A developmental study by Aksu-Koç and colleagues (Aksu-Koç et al. 2009; Ögel-Balaban, Aksu-Koç, and Alp 2012) asked how the acquisition of evidential distinctions might influence the timetable of the development of source monitoring. In a linguistic task, young Turkish speakers between the ages of three and six learned about events through visual perception, inference, or hearsay, and were asked to describe these events. Then children were given two standard source monitoring tasks. In the source choice task (adapted from Gopnik and Graf 1988), children discovered the contents of a box by visual access, verbal communication, or inference, and were asked to report how they came to know about the contents of the container. In the speaker choice task (adapted from Drummey and Newcombe 2002), children heard several statements uttered by two female speakers. Later, children were presented with another set of statements and had to choose which speaker originally uttered each one. Children's performance in the source task did not correlate with accurate production of evidential morphology in the linguistic task. However, children's performance in the speaker choice task was predicted by their production of the hearsay morpheme (*-mIş*) in the linguistic task. Furthermore, Aksu-Koç and colleagues argued that the four-year-olds in their speaker choice task outperformed the English-speaking four-year-olds in Drummey and Newcombe's study. The authors tentatively concluded that the acquisition of evidential morphology can shape the development of source monitoring in language-specific ways, and that, in Turkish, acquiring evidential morphology helps children recall the source of a verbal report (as indexed by the speaker choice task).

Although these findings are suggestive of a relation between linguistic and cognitive development, several factors limit the conclusions that can be drawn about the nature of this relation. First, given that the Turkish indirect evidential, on its hearsay interpretation,

does not actually encode the speaker from whom the information is acquired, it is surprising that the production of the hearsay morpheme predicted performance in the speaker choice task. Semantically, there is a straightforward mapping between the meanings of Turkish evidentials and the information sources assessed in the source choice task—and yet children's performance in the source task did not correlate with accurate production of evidential morphology. Second, since this was a correlational study, the direction of the causal relationship between language and cognitive development might be the opposite of what the authors propose. Rather than evidential production driving success on the speaker choice task, it could be that the ability to track the source of a verbal report might drive accuracy in using the indirect evidential in its hearsay function. Finally, it is difficult to make claims about potential cross-linguistic differences in the developmental timetable of source monitoring without directly comparing different language groups (here, English and Turkish learners).

In a study that involved a direct comparison between language groups, Lucas, Lewis, Pala, Wong, and Berridge (2013) tested young learners of English, Turkish, and Chinese on false belief, executive function and flexible trust tasks. In the flexible trust task that is most relevant for present purposes, children had to keep track of two speakers' accuracy in labelling objects in order to be able to select which speaker to trust when learning a label for a novel object. Children were also given standard false belief tasks and executive function measures. The results revealed that only Turkish-speaking four-year-olds performed above chance levels in the false belief task. As expected based on prior research, Chinese children outperformed the other two language groups in the executive function measures. Importantly, in the flexible trust task, Turkish-speaking children performed better than both English-speaking and Chinese-speaking children. The authors hypothesized that Turkish children's superior performance in the false belief and flexible trust tasks can be attributed to learning a language with grammaticalized evidentiality.

Unfortunately, this hypothesis could not be tested directly since Lucas and colleagues did not include a measure of Turkish children's knowledge of evidential language. Furthermore, Lucas and colleagues did not directly test whether the relation between language and flexible trust was mediated by false belief performance, so the mechanism that might transmit language effects on flexible trust is unknown. This is especially important given that the mapping between the meaning conveyed by evidentiality markers (direct, hearsay, or inference) and the information sources in the task (Speaker A versus Speaker B) was not straightforward (as in the studies of Aksu- Koç and colleagues). A more recent study that included a comparison between Turkish- and English-speaking four-year-olds' source monitoring revealed similar performance in the two language groups (Ünal and Papafragou 2015). In that study, Turkish-speaking four-year-olds were highly successful in gaining knowledge about events from both direct/perceptual and indirect/inferential evidence, but had difficulty attributing perception- or inference-based knowledge to someone else for the very same events. Crucially, an age-matched group of English-speaking four-year-olds were no less accurate than their Turkish-speaking peers when tested with the very same tasks.

In another cross-linguistic comparison, Papafragou, Li, Choi, and Han (2007) asked whether the development of source monitoring proceeds differently in learners of English and Korean, a language that morphologically encodes direct evidence (*-e*) versus hearsay (*-tay*). In the Self task children discovered what object was hidden in a doll's house either by looking inside the doll's house or from the experimenter's verbal report, and reported how

they knew. In the Others task, children had to identify which one of the two puppets was more knowledgeable about the contents of a container. One of the puppets either looked inside the container or was told about its contents. The other puppet did not gain access to the container's contents because it simply performed an irrelevant action such as kicking or shaking the container. Children had higher success in reporting how they had found out about the hidden object themselves (i.e. Self task) as opposed to identifying the knowledgeable puppet (i.e. Others task). Crucially, there was no language effect, showing that source monitoring proceeds similarly in learners of English and Korean.

In the same study, a subset of the Korean learners was also given an evidential production task. The task showed that these children were in the process of acquiring the evidential distinctions in their language. More detailed comparisons between the evidential comprehension and non-linguistic source monitoring tasks revealed that Korean-speaking children performed better in the non-linguistic task compared to the linguistic task. This asymmetry offers evidence against the possibility that evidential distinctions in language serve as pacesetters for cognitive development. Additional support for this conclusion comes from more recent work with Turkish learners using a fuller battery of matched linguistic and non-linguistic tasks (Ozturk and Papafragou 2016); this work shows that Turkish-speaking children have difficulty with aspects of linguistic evidentiality even after mastering the corresponding information-access concepts. Thus children's knowledge of evidentiality follows, and probably builds on, their ability to handle information sources.

Summarizing, there is currently a small number of cross-linguistic studies on the development of source monitoring. Although some of these studies have reported a source monitoring advantage for Turkish learners over English learners, these studies lacked important controls and suffered from several interpretative issues (Aksu-Koç et al. 2009; Lucas et al. 2013; Ögel-Balaban et al. 2012). One study that did include those controls (Papafragou et al. 2007) found that young learners of English and Korean converge in their source monitoring abilities (see also Ünal and Papafragou 2015). Furthermore, there is evidence that acquiring evidential morphology lags behind the ability to reason about information sources in several respects (Ozturk and Papafragou 2016; Papafragou et al. 2007). Together, findings from these studies support the idea that cognitive development follows a similar timetable across learners of languages with different evidential systems, and that language builds on (rather than shapes) the ability to reason about different types of information access.

8.4. Conclusions

In the present chapter, we have reviewed a growing body of experimental studies addressing the relation between linguistic evidentiality and source monitoring. Our goal was to assess whether the linguistic encoding of information source affects source monitoring in adults and children from different language backgrounds and to use this evidence to throw light on broader theoretical debates about how language interfaces with cognition.

Both adult and developmental studies have shown that linguistic categories of evidentiality have cognitive consequences, but that these linguistic influences are strictly limited to cases where language was explicitly involved in a cognitive task (e.g. contexts in which people

had to process sentences with evidential markers; Aydın and Ceci 2009, 2013; Tosun et al. 2013). These cross-linguistic differences did not extend to situations in which speakers were tested with a cognitive task that did not require processing linguistic stimuli (Papafragou et al. 2007; Ünal et al. 2016). Even though some studies claim to have discovered cross-linguistic differences in the development of source monitoring (Aksu-Koç et al. 2009; Lucas et al. 2013; Ögel-Balaban et al. 2012), several aspects of these studies are problematic. Taken together, the available evidence suggests that cross-linguistic variation in the expression of evidentiality does not alter the mechanisms of source monitoring in adults or the timetable of cognitive development in children. In both cases, learned linguistic categories of evidentiality do not serve as a guide to conceptual representations of information sources (and may, in fact, develop later than such conceptual representations in young learners; Ozturk and Papafragou 2016; Papafragou et al. 2007). These conclusions cohere with a broader perspective about the role of language in cognitive processes, according to which the effects of language are carried online, in the moment of performing cognitive computations and do not alter the underlying conceptual structure (cf. also Gleitman and Papafragou 2005, 2012; Ünal and Papafragou, in press, for supporting evidence from other domains).

Further research is needed to gain a richer understanding of how linguistic evidentiality interacts with source concepts. Most of the research reported here has focused on the contrast between grammatical versus lexical encoding of information source. However, there is considerable variation even within the class of grammatical evidential systems, with some systems having several dedicated evidential morphemes within the classes of direct and especially indirect access (see Aikhenvald 2004a, 2014). It is an open question whether richer evidential systems including obligatory (or at least frequently used) distinctions might place different pressures on the source monitoring processes in the minds of the speakers.

This possibility is currently hard to evaluate because we lack information about how more complex evidential systems are actually used during conversation to mark different types of information access (see Ünal et al. 2016). Furthermore, despite their cross-linguistic surface variability, grammatical evidential paradigms appear to be subject to several constraints (Faller 2001; Willett 1988). For instance, the meanings typically encoded by evidentials are abstract (Speas 2004b); many grammatical systems of evidentiality seem to respect the broad semantic distinction between direct/visual access, indirect/inferential and indirect/hearsay access, and even though finer subdivisions within these broad classes are possible, four- and five-way evidential systems are in fact quite rare (Aikhenvald 2014). These broad regularities also appear to affect the learnability of evidential systems (Bartell and Papafragou 2015). Future studies of evidentiality should explore more specific links between semantic evidential distinctions and the corresponding source concepts using careful comparisons of matched linguistic and non-linguistic tasks (cf. Ozturk and Papafragou 2016; Papafragou et al. 2007; Ünal and Papafragou 2016).

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